

REMARKS

Claims 16-39 are pending in this application. Non-elected claims 16-26 are withdrawn from consideration.

I. Claim Rejection Under 35 U.S.C. § 103

The Examiner maintains the rejection of claims 27-39 under 35 U.S.C. §103(a) as being unpatentable over Maeda et al. (US 6,189,771) in view of Imamura et al. (US 2002/0185309), and further in view of Mei (US 6,680,128) in view of Kang et al. (US 5,837,119). Applicants respectfully traverse the rejection.

The soldering processes of claims 27 and 33 each comprise a first step of supplying a flux that contains a metal powder in the form of scales. The Examiner admits that Maeda et al. and Imamura et al. do not disclose metal powder in the form of scales, but asserts that it would have been obvious to include the flake-shaped powders of Kang in the solder paste of Mei (see final Office Action, page 3, 2nd paragraph).

In Mei, the solder composition is **melted as a whole**, including the silver coated tin alloy particles (see col. 4, lines 10-12). As a result, there are no more “particles” in the finally formed connection, because the whole (entire) composition melts and solidifies. Therefore, one skilled in the art would have no reason to consider the shape of the (melted) particles to have anything to do with the electrical conduction upon the formation of the connection.

The teaching of “better electrical conduction” in Kang is only applicable to the connection in which there are particles throughout the solder mass, even after the formation of the connection. Because Mei teaches to melt the solder composition as a whole, there are no more particles left in Mei’s composition and the shape of the (non-existent) particles is completely irrelevant. As a result, the teaching of Kang cannot be applied to Mei, in which no particle remains in the finally formed connection, to arrive at the presently claimed invention.

In the Advisory Action of July 15, 2011, the Examiner takes the position that the solder particles of Mei’s solder composition are melted and then cooled to become solid again wherein the solder particles nucleate and grow. The Examiner states, “after the solidification process, the particles in the solder have returned”. Thus, the Examiner’s position seems to be that the molten solder particles become solder particles once again in the resolidification process.

However, as discussed above, in Mei the molten solder particles become a solder mass when solidified in order to electrically connect the electrodes, and the solidified solder mass does

not contain particles that correspond to a metal powder in the form of “scales”, as recited in claims 27 and 33.

In the Advisory Action of August 11, 2011, in response to the arguments above, the Examiner states, “However, as ‘particle’ is not defined in the specification, each atom of the metal powder may be a particle. ‘Particle’ is further not required to be of a particular shape and size. Therefore, even after solidification, the solder mass comprises particles.”

A person of ordinary skill in the art would clearly recognize the difference between the concept of a “particle” and an “atom”, even without an explicit definition of “particle” in the present specification or any of the cited references. The “atoms” that form the solder mass upon soldering in Mei is not included in the concept of “particle” according to the context of the present specification. Thus, a person of ordinary skill in the art would understand that the claimed invention is not concerned with an “atom”, and would understand that a metal “powder” in the form of “scales”, as recited in claims 27 and 33, is clearly distinguished from an “atom”.

In addition, paragraph [0026] of the specification states the following (emphasis added):

Each of the elements which constitute the **metal powder may be in the form of any of various particles and other shapes (such as a plate form, a scale form, a flake form, a short fiber form, a dendrite form, a thin piece form, an atypical form and the like)**, and for example, it may be a spherical form or an atypical form. The element may have an edge portion, a convex portion and/or a concave portion. A bridging function which will be explained below more favorably appears when the elements constituting the metal powder **are thin as in the form of the scales**, the thin pieces or the flakes, or they are in the dendrite form.

In view of this description, a person of ordinary skill in the art would understand that the elements that constitute the metal powder are scales, and that the “scale form” is a type of particle distinguished from a single atom. Thus, a particle is clearly described in the present specification in terms of, for example, a scale form, a flake form, a thin piece form, etc., and the claims specifically recite “scales”.

Moreover, claim 33 recites “a metal powder in the form of scales of which constituting elements are comprised of cores and coatings around the cores”. One skilled in the art would recognize that scales “comprised of cores and coatings around the cores” are clearly distinguished from a single atom.

Therefore, one skilled in the art would clearly understand that claims 27 and 33 require the metal powder to be in the form of “scales”, and would clearly understand how “scales” are

distinguished from “atoms” in a solder mass.

Therefore, the solidified solder mass of Mei does not contain particles that correspond to “metal powder” in the form of “scales”, as recited in claims 27 and 33.

In addition, in the Advisory Action of August 11, 2011, the Examiner states “Please note that the claim as written does not require metal particles of the flux to be in particulate form after the reflow process”.

However, claim 27 recites “a metal powder made of a metal which has **a melting point higher than that of a solder material** which forms the solder portion”, and claim 33 recites “the coatings are made of a metal which has **a melting point higher than that of a solder material** which forms the solder portion”. In addition, both claims recite “a third step of heating so as to melt the solder portion, so that a molten solder material from the solder portion comes in contact with the second electrode”, and “a fourth step of solidifying the molten material after the third step”.

Because both claims require the metal to have **a melting point higher than the solder material**, one skilled in the art would clearly recognize that **the metal powder does not melt** during the third step of heating to form a molten solder material. Therefore, one skilled in the art would recognize that claims 27 and 33 do require the metal powder to be present in the solidified molten material in the form of scales. Accordingly, the claims, as written, require the metal powder to be in a particular form (i.e., scales).

In view of the foregoing, a person of ordinary skill in the art would recognize that claims 27 and 33 would not have been obvious over the cited references.

Claims 28-32 and 34-39 depend directly from claim 27 or 33, and thus also would not have been obvious over the references.

Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. Double Patenting Rejections

The Examiner maintains the provisional rejection of claims 27, 33 and 39 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 4 of copending application No. 10/585,729, and maintains the provisional rejection of claims 27, 33 and 39 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 2 of U.S. Patent No. 7,632,710.

Applicants respectfully request the Examiner to hold these rejections in abeyance, pending an indication that the claims are otherwise allowable.


III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

If the Examiner finds that anything further is needed to place the application in better condition for allowance, then she is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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